

Pommerehne, Werner W.

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INSTITUTIONAL APPROACHES TO PUBLIC  
EXPENDITURES: EMPIRICAL EVIDENCE  
FROM SWISS MUNICIPALITIES

Werner W. Pommerehne  
November 1976

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A<sub>9</sub> 10 77 Weltwirtschaft  
Kiel

D-7750 Konstanz  
Postfach 7733

C 76914

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# INSTITUTIONAL APPROACHES TO PUBLIC EXPENDITURES:

## EMPIRICAL EVIDENCE FROM SWISS MUNICIPALITIES

by Werner W. Pommerehne \*)

University of Konstanz

### I. INTRODUCTION

This paper has three goals:

- (1) To provide an empirical comparison of various approaches to the problem of estimating public expenditures. The traditional regression approach using average values of income and other variables is contrasted with the median voter approach.
- (2) Institutional aspects of collective decisions are explicitly introduced into the estimation models and it is shown that differences in institutions have a significant effect on outcomes.
- (3) Parties' ideological tastes are introduced in those cases in which the constraints imposed by the voters (in particular referenda) are not strongly binding.

The paper shows that the median voter model is better suited to explain publicly supplied goods and services in a direct democracy than the traditional average approach. Under appropriate conditions, the median voter model <sup>also</sup> may be used to explain the outcome of collective decisions in representative democracies. If those conditions do not obtain the median voter model must be modified to allow for the possibility that governments may pursue their own goals.

Part II discusses the assumptions underlying the median voter model and it is shown how far the political process in Swiss municipalities conform to this model. Part III tests the model's performance in the case of direct and representative democracy. Part IV develops hypotheses about the influence of institutional government constraints on expenditure in representative democracies. The last part tests these propositions.

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## II. THE MEDIAN VOTER MODEL REVISITED

### The Model

As shown by BLACK (1958), and generalized by RAE and TAYLOR (1971), the median voter is decisive in collective decisions if a set of conditions is satisfied. These conditions are:

- (i) That the voters are completely informed about the utility of collectively provided services as well as about their tax prices, and that they act as if they maximized the utility of the consumption of market and collectively supplied goods and services;
- (ii) that the voters do not act strategically, i.e., that they reveal their "true" preferences also for publicly supplied goods;
- (iii) that there is neither explicit nor implicit logrolling;
- (iv) that the problems connected with cyclical majorities can be excluded; and finally
- (v) that the preference aggregation takes place by simple majority rule, either by direct voting, or by a vote between two parties which constantly compete for the government.

If these conditions are met, income and (tax-) price elasticities of the demand for publicly supplied goods and services can be determined using the median voter model by cross sectional analysis. In such estimates, the differing degrees of "publicness" of publicly supplied goods and their consequences for the financial burden of voters/tax payers must be accounted for. With a pure public good (in SAMUELSON's sense) one person's consumption does not exclude the consumption of others. The larger the group of individuals financing the good the smaller is ceteris paribus the individual tax share. In the case of

an impure public good the quantity perceived by the median voter decreases with an increasing number of users continually, due to crowding for example. If  $x_i$  is the (physical) quantity of good  $i$  publicly supplied,  $n_i$  the number of users and  $x_i^{IN}$  the consumable quantity as individually perceived, we have<sup>1)</sup>

$$x_i^{IN} = x_i \cdot n_i^{-\delta} \quad (1)$$

$\delta$  is the degree of publicness of good  $i$ : In the case of a pure public good,  $\delta = 0$ . The stronger the individually perceived consumable quantity falls with the increasing number of users, the larger is the crowding parameter  $\delta$ .

The median voter's demand for individually consumable quantities of a publicly supplied good  $i$  ( $\hat{x}_i^{IN}$ ) depends on his income ( $\hat{Y}$ ), and his costs of acquiring the good, which in this case corresponds to the tax price ( $\hat{t}$ )<sup>2)</sup>.

Using a constant elasticity demand function:

$$\hat{x}_i^{IN} = k \cdot \hat{Y}^\alpha \cdot \hat{t}^\beta \quad (2)$$

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1) See, e.g., BERGSTROM and GOODMAN (1973, p. 282) and BORCHERDING and DEACON (1972, p. 893). It should be added that this relationship implies non-discrimination, i.e., excludes regional or groupwise discrimination of the provision of publicly supplied goods. See, however, DENZAU and MACKAY (1976) as an attempt to take account of such limitations of usage.

2) The median voter's budget constraint is

$$\sum p_m \cdot x_m + \hat{\tau} \cdot \bar{p}_{x_i} \cdot \hat{x}_i = \hat{Y},$$

where  $\sum p_m \cdot x_m$  is the value (equal price times quantity) of the goods<sup>m</sup> traded in the market;  $\hat{\tau}$  his tax share (i.e., his relative contribution to the costs of production of the publicly supplied good);  $\bar{p}_{x_i}$  the unit cost of production (or "price") of the good  $i$ , assumed to be constant. Substituting eq. (1) into this equation gives

$$\sum p_m \cdot x_m + \hat{\tau} \cdot \bar{p}_{x_i} \cdot \hat{x}_i^{IN} \cdot n_i^\delta = \hat{Y}.$$

The second term of the left hand side,  $\hat{\tau} \cdot \bar{p}_{x_i} \cdot \hat{x}_i^{IN} \cdot n_i^\delta$ , is the amount of income taxed away in order to finance the costs of producing the publicly supplied good. The "tax price" is  $\hat{t} = \hat{\tau} \cdot \bar{p}_{x_i}$ .

The collective decision must be taken with respect to the quantity of the physical public good,  $x_1$ , the relevant demand function of the median voter is therefore:

$$\hat{x}_1 = k \cdot \hat{Y}^\alpha \cdot \hat{t}^\beta \cdot n^\delta, \quad (3)$$

noting that  $x_1^{IN} = x_1 \cdot n^{-\delta}$ .

Multiplying by the unit price of the publicly provided good  $i$  (assumed to be the same in all  $j$  communities)<sup>1)</sup>, the demand function usable for empirical estimation is

$$\ln E_{ij} = c + \alpha \ln \hat{Y}_j + \beta \ln \hat{t}_j + \gamma \ln n_j + \xi_{ij}, \quad (4)$$

where  $E_{ij}$  stands for the public outlays (price times quantity) for the publicly supplied good  $i$  in the community  $j$ <sup>2)</sup>,  $c = \ln k$ ,  $\alpha$  and  $\beta$  are the income and price elasticities of demand, respectively,  $\gamma = \delta(1 + \beta)$ <sup>3)</sup> is the elasticity of demand with respect to the groups of users, and  $\xi_{ij}$  is the error term<sup>4)</sup>.

To test the performance of the model corresponding to this equation, it seems straightforward to compare the estimates reached with eq. (4) with the estimates of the ad-hoc

1) This is one possibility of formulation as chosen, e.g., by BERGSTROM and GOODMAN (1973). Another possibility consists of starting from the same tax prices and to account for the different input prices (per unit of the same good) between the various communities (as done, e.g., by BORCHERDING and DEACON, 1972).

2) As the price  $\bar{p}_{x1j}$  is assumed to be constant over units and communities, it does no longer enter equation (4).

3) Introducing  $\hat{t} = \hat{\tau} \cdot \bar{p}_{x1}$  into (3) gives

$$\begin{aligned} \hat{x}_1 &= k \cdot \hat{Y}^\alpha \cdot (\hat{\tau} \cdot \bar{p}_{x1} \cdot n_i^\delta)^\beta \cdot n_i^\delta \\ &= k \cdot \hat{Y}^\alpha \cdot \hat{\tau}^\beta \cdot n_i^{\delta(1 + \beta)}. \end{aligned}$$

4) Though the specification of this model does not put any restrictions on the parameters to be estimated, in order to perform the standard statistical tests on the significance of the estimated coefficients, it seems useful to assume  $\xi_{ij}$  to be normally distributed with zero mean and constant finite variance.

regression approach of public finance, which uses the average values of income, as well as other variables:

$$\ln E_{ij} = c' + \alpha' \ln \bar{Y}_j + \beta' \ln \bar{t}_j + \gamma' \ln n_j + \xi'_{ij}. \quad (5)$$

$\bar{Y}_j$  and  $\bar{t}_j$  are average income and average tax share, respectively<sup>1)</sup>. Using the same data set for all other variables the estimation function derived from the theoretical model should - if properly applied - lead to superior results compared to the "estimation without theory" which has so long dominated this area. The correct application implies, however, that the institutional context is in fact captured by the model in a satisfactory way.

#### Institutions Introduced

The political system of Swiss municipalities<sup>2)</sup> is characterized by considerable institutional differences in the period considered (around 1970). One part of the cities (mostly small ones, up to 10'-20'000 inhabitants) has a direct democracy, while the other part has the institution of representative democracy.

Decisions in the context of direct democracy, are taken by simple majority rule in local assemblies which may be called together by a small number of citizens. Changes of motions may be proposed from the floor. The tax system is largely predetermined as the most important local tax, the income tax, is fixed as an additional tax of the respective Cantonal income tax which (over a wide income range) is proportional. There is therefore a good

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1) The traditional average approach as presented in eq. (5), constitutes an already improved formulation, as most traditional average regression approaches do not consider the influence of the tax price on demand, resulting in a considerable specification error.

2) The following account is based on a survey among the 111 largest Swiss cities for the purpose of this paper as there was no comprehensive study available of the structure and functioning of the Swiss political communities. Related studies dealing with the structure of the political system of Swiss cities are quoted in the appendix.



correspondence with the conditions necessary for the application of the median voter model (see POMMEREHNE, 1974, p. 468 et seqq.):

- (i) Strategic voting can be excluded due to the predetermined tax system;
- (ii) explicit or implicit logrolling seems unlikely due to high costs;
- (iii) the problem of cyclical majorities seems to be of little importance in this case because the probability of its occurrence falls strongly with the number of decision makers, given an approximately constant issue space (TULLOCK, 1967);
- (iv) with each additional expenditure proposal the changes of the income tax rate must simultaneously be determined. Each individual is thus automatically informed about the implied change in his tax price.

The situation is quite different in cities with the institution of representative democracy. Decisions about services publicly provided are - at least up to a certain expenditure limit - undertaken by the government. The government is a committee composed of (in the average) three to four parties<sup>1)</sup> which is elected each fourth year by direct vote. The voter/taxpayer has only limited possibilities of influencing the decision taken by the committee: In the case of decisions which require the consent of the body of citizens (obligatory referendum) or by way of optional referendum. The latter possibility is often restricted in that an optional referendum may only be taken by the citizens if the expenditure item suggested by the government is higher than a specific amount.

Compared with direct democracy, this provides considerable scope for decisions which are not necessarily in accordance

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1) In Switzerland, there is a typical multi-party system. See for example HENIG and PINDER (1969) and GIROD (1964).

with the median voter's preferences. Some testable hypotheses may be derived about the consequences of the institutional set-up upon the outcome of collective decision-making. The application of the median-voter model leads to the expectation that:

- (i) the income and price elasticities are of more explanatory power in the case of direct, than in representative, democracy;
- (ii) there are superior estimation results for municipalities with direct democracy than can be reached with the traditional average model<sup>1)</sup>.

### III. TESTING DIRECT DEMOCRACY

To test the above hypotheses about the influence of different institutional arrangements on the outcome of the collective decision making process, the largest 110 Swiss cities are grouped according to whether (in 1970) they had the institutions of direct (46 municipalities) or representative (64 municipalities) democracy<sup>2)</sup>. The largest city is Zurich with 422'000, the smallest Arosa with 2'717 inhabitants. For both types of democracies, the estimation equations (6) and (7) - which are slight modifications of eq. (4) and (5) - are used:

$$\ln E_{ij} = c + \alpha \ln \hat{Y}_j + \beta \ln \hat{t}_j + \gamma \ln n_{kj} + \mu S_{mj} + \varepsilon_{ij}, \quad (6)$$

$$\ln E_{ij} = c' + \alpha' \ln \bar{Y}_j + \beta' \ln \bar{t}_j + \gamma' \ln n_{kj} + \mu' S_{mj} + \varepsilon'_{ij}. \quad (7)$$

$n_{kj}$  is the size of different groups of users of the publicly supplied good  $i$ .  $S_{mj}$  points to the number of

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1) It is a priori impossible to state whether this also holds for cities with representative democracy.

2) The city of Basle is excluded because the municipal and Cantonal government is identical.

ecological variables for each city  $j$ . The users which may influence the demand expressed by the median voter in municipality  $j$  are the number of residential population ( $n_{1j}$ ) and - a factor of considerable importance in some of the Swiss cities - the number of tourists ( $n_{2j}$ ). The latter are approximately captured by the average daily number of lodgings for the night. The  $S_m$  variables which may be found in the literature on the determinants of public expenditures<sup>1)</sup> are introduced ad hoc. They cannot be given a simple supply or demand interpretation: The share of the population of age 0-19 ( $S_1$ ) and those above 65 ( $S_2$ ) in the population is introduced because some public expenditure areas may be specially affected by these two groups. The population density ( $S_3$ ) is included for similar reasons. All variables refer to 1970 and are taken from the official statistics<sup>2)</sup>. The values of the further independent variables, median income, average income per capita and the corresponding tax prices for the year 1970 are calculated on the basis of Federal Income Tax statistics and of the Census for 1970<sup>3)</sup>.

Public expenditures according to functions (cash value of current and investment expenditures) are collected from official statistics. They refer to the average yearly expenditures over the period 1969-71. The use of average values serves to exclude a possible bias due to, e.g., bulky investments.

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1) See, e.g., WILENSKY (1970) and the literature quoted there.

2) For the sources, see the appendix. In addition to those already mentioned, other ecological variables were introduced (such as the growth of residential population). In general, they were not statistically significant and were therefore omitted in the following estimates. As long as it is unknown how these variables affect demand, the specification is not incomplete. However, specification is incomplete because other prices (substitutes and complements) are omitted. This theoretically cannot be, but as a practical matter little else can be done save assume that all other prices are approximately constant across units (since this includes all  $i$  goods, it implies that the cross-effects of say education on culture is zero).

3) For sources and the procedure used see the appendix.

The estimates of equations (6) and (7) use the general-least-square (GLS) technique in order to avoid problems of heteroscedasticity. A comparison of residual variances of the error terms with the F-test (using a two-tailed significance level of 5%) indicates that there is no heteroscedasticity<sup>1)</sup>. The values of simple correlation coefficients suggests the absence of any grave problems of multicollinearity. The estimation results for municipalities with direct democracy are given in Table 1, for municipalities with representative democracy in Table 2. Each one presents estimates with the median voter model (eq.6) and with the traditional average model (eq. 7).

Table 1 shows that if the median voter model is appropriately used, it has a higher degree of explanatory power and yields statistically more significant estimates for all municipal expenditure areas, than if the traditional average model is used<sup>2)</sup>. All parameters estimated with equation (6) have, moreover, the theoretically expected sign and are in most cases statistically significant: All price elasticities are negative and are (with the exception of two cases) significant at a level of security of 1%. The estimates with the traditional average model yield only one statistically significant price elasticity. Similar results apply to the estimates of the income elasticities which have a theoretically expected positive sign: In the case of the traditional average model only one parameter is statistically significant (but carries an unexpected negative sign), the estimates with the median voter model results in 5 out of 8 coefficients of income elasticity being statistically significant. The demand elasticities with respect to the size of the user groups of publicly supplied goods are more often significant with the median voter than with the traditional average model.

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1) For a description of the test see JOHNSTON (1972, p. 219)

2) The estimation results ( $\bar{R}^2$ ) using the median voter model are in two cases significantly better (using a two-tailed significance level of 5%), applying the Chi-Square test and taking the  $\bar{R}^2$  of the traditional average estimates as null hypothesis.

Spending Categories		Intercept	Demand Elasticities with Respect to				Population			$\bar{R}^2$
			Income ( $\alpha$ )	Tax Share ( $\beta$ )	Population ( $\lambda_1$ )	Tourists ( $\lambda_2$ )	Percent 0-19	Percent 65 <sup>+</sup>	Density	
General Admini- stration	Median Voter	-7.116 (1.573)	0.826* (2.160)	-0.436** (2.947)	0.335 (1.598)	0.035 (0.653)	-0.073** (3.127)	-0.050* (2.483)	-0.009 (1.898)	0.714
	Trad. Average	-1.112 (0.293)	0.302 (0.951)	-0.492 (0.993)	0.345 (0.689)	0.054 (0.917)	-0.093** (3.386)	-0.062** (3.132)	-0.012* (2.346)	0.642
Police, Fire Protection	Median Voter	-10.492 (1.336)	0.834 (1.255)	-0.481* (2.072)	1.126** (3.100)	0.218* (2.374)	0.083* (2.030)	0.045 (1.289)	-0.020* (2.425)	0.637
	Trad. Average	-3.343 (0.545)	0.187 (0.364)	-1.302 (1.625)	0.401 (0.496)	0.261** (2.740)	-0.105* (2.365)	0.036 (1.197)	0.024** (2.922)	0.618
Education, Recreation, Sports	Median Voter	-12.231** (3.184)	0.939** (2.891)	-0.503** (4.003)	0.720** (4.047)	-0.010 (0.222)	0.036 (1.794)	0.011 (0.636)	0.007 (1.803)	0.806
	Trad. Average	-4.714 (1.351)	0.292 (0.998)	-0.274 (0.601)	1.015* (2.202)	0.002 (0.045)	0.008 (0.324)	-0.004 (0.234)	-0.004 (0.901)	0.727
Health, Hospitals	Median Voter	-28.945 (1.473)	2.694 (1.621)	-1.595* (2.472)	0.139 (0.151)	-0.083 (0.353)	-0.113 (1.098)	-0.005 (0.052)	-0.013 (0.648)	0.358
	Trad. Average	35.236* (2.080)	-2.915* (2.009)	-1.086 (0.536)	0.742 (0.361)	-0.143 (0.592)	-0.416** (3.606)	-0.025 (0.282)	-0.021 (1.024)	0.313
Social Assistance	Median Voter	-0.723 (0.119)	0.008 (0.155)	-0.345 (1.722)	0.841** (2.977)	-0.150* (2.085)	-0.055 (1.733)	0.051 (1.815)	-0.007 (1.128)	0.638
	Trad. Average	-2.038 (0.354)	0.020 (0.041)	-0.360 (0.517)	0.905 (1.287)	-0.088 (1.059)	-0.057 (1.454)	0.063* (2.170)	-0.012 (1.744)	0.529
Roads	Median Voter	-15.606* (2.624)	1.499** (2.983)	-0.756** (3.890)	0.531 (1.929)	0.117 (1.679)	-0.051 (1.664)	-0.024 (0.905)	-0.016** (2.659)	0.720
	Trad. Average	-3.886 (0.742)	0.475 (1.082)	-0.962 (1.404)	0.439 (0.634)	0.147 (1.799)	-0.090* (2.365)	-0.047 (1.710)	-0.021** (3.047)	0.629
Environ- mental Protection <sup>b)</sup>	Median Voter	-22.415** (3.845)	1.996** (4.051)	-1.250** (6.561)	-0.044 (0.400)	-0.016 (0.234)	0.014 (0.467)	0.002 (0.062)	-0.007 (1.109)	0.756
	Trad. Average	-12.047 (1.923)	1.077* (2.050)	-1.593 (1.945)	-0.165 (0.199)	0.083 (0.851)	-0.012 (0.282)	-0.021 (0.623)	-0.016 (1.994)	0.512
Aggregate <sup>c)</sup>	Median Voter	-11.958** (2.949)	1.258** (3.670)	-0.739** (5.576)	0.453* (2.413)	0.005 (0.100)	-0.021 (0.992)	-0.022 (1.241)	-0.006 (1.346)	0.842
	Trad. Average	-7.922* (2.044)	0.901* (2.772)	-0.755 (1.490)	0.565 (1.105)	0.064 (1.060)	-0.024 (0.861)	-0.037 (1.811)	-0.011* (2.173)	0.733

a) Figures in parantheses below the parameter estimates indicate the t-values. An asterisk indicates statistical significance at the 95% level, two asterisks at the 99% level of security.

b) Includes municipal expenditures for civil defense.

c) Additional including interest payments on public debt.

The estimates of the expenditure items for social assistance and police indicate a positive and significant influence of the number of tourists. The last area as well as the expenditures for municipal roads show a strong influence of two ecological variables, the share of young people (in both cases with a negative sign) and of population density (in the case of police with a positive, and in the case of municipal roads expenditure with a negative sign).

In the case of representative democracy, the median voter model does not seem to be as adequate for the analysis of the problem discussed (see Table 2). However, compared to the estimates with the traditional regression approach, it still leads to somewhat superior results<sup>1)</sup>. The explanatory power is not significantly better in any expenditure category (in one case, the traditional average model yields even better estimates). The median voter approach is superior in particular with respect to the influence of tax prices: the parameters are in seven cases statistically significant, in the traditional average model in four cases, only. The same applies to the influence of population. On the other hand, the tourists as another user group seem to have a more pronounced influence in the traditional average model. Compared to Table 1, the ecological variables have an even smaller effect on public expenditures. (This may, however, be the result of an aggregation effect, as the cities with a larger weight - i.e., the big cities - usually are representative democracies).

The average degree of "publicness"  $\delta$  is not presented in the tables because the two components from which it is derived, namely the tax price elasticities  $\beta_1$  and the demand elasticities with respect to the size of the user groups  $\sum \gamma_{kj}$  were not always statistically significant. Those values of  $\delta$  which can be calculated from statistically significant parameters  $\gamma$  and  $\beta$  indicate that in both groups of municipalities the degree of publicness is above one. This

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1) Using the Chi-Square test (footnote 2, p.9) there are no statistically significant differences between the  $\bar{R}^2$  of both estimates. However, applying the sign-test there are statistically better results in the case of median voter estimates at the 10% level of security.

**Table 2:** 64 Swiss Municipalities with Representative Democracy: Comparison of the Performance of the Median Voter Model with the Traditional Average Model (Average of Current and Investment Expenditures 1969-71<sup>a)</sup>).

Spending Categories		Intercept	Demand Elasticities with Respect to				Population			R <sup>2</sup>
			Income ( $\alpha$ )	Tax Share ( $\beta$ )	Population ( $\gamma_1$ )	Tourists ( $\gamma_2$ )	Percent 0-19	Percent 65 <sup>+</sup>	Density	
General Admini- stration	Median Voter	-6.983 (1.755)	0.517 (1.403)	-0.320* (2.047)	0.555** (3.450)	0.053 (1.264)	-0.001 (0.042)	-0.010 (0.418)	0.002 (0.739)	0.805
	Trad. Average	-9.950* (2.573)	0.807* (2.189)	-0.032 (0.088)	0.828* (2.328)	0.076 (1.922)	0.012 (0.516)	-0.006 (0.215)	0.002 (0.847)	0.804
Police, Fire Protection	Median Voter	-11.267* (2.355)	0.604 (1.367)	-0.291 (1.600)	0.803** (4.302)	0.079 (1.587)	0.015 (0.584)	0.142** (4.798)	-0.002 (0.561)	0.879
	Trad. Average	-5.878 (1.247)	0.094 (0.212)	-0.268 (0.616)	0.811* (2.025)	0.105* (2.216)	0.078 (0.245)	0.143** (4.610)	-0.002 (0.696)	0.874
Education, Recreation, Sports	Median Voter	-11.419* (2.185)	0.949 (1.959)	-0.481** (2.976)	0.463* (2.191)	0.052 (0.932)	0.026 (0.872)	0.001 (0.042)	0.0005 (0.129)	0.773
	Trad. Average	-9.330 (1.786)	0.770 (1.546)	-1.087* (2.191)	0.003 (0.006)	0.094 (1.764)	0.026 (0.811)	-0.006 (0.165)	-0.001 (0.156)	0.763
Health, Hospitals	Median Voter	-21.157 (1.788)	2.110 (1.690)	-1.516** (2.861)	-0.344 (0.627)	0.183 (1.332)	-0.014 (0.184)	0.017 (0.202)	-0.012 (1.344)	0.496
	Trad. Average	-9.709 (0.800)	0.818 (0.705)	-4.556** (3.961)	-3.258** (2.926)	0.267* (2.133)	-0.054 (0.725)	-0.040 (0.489)	-0.018* (2.018)	0.550
Social Assistance	Median Voter	-11.820* (2.635)	0.791 (1.903)	-0.640** (3.636)	0.670** (3.690)	-0.026 (0.546)	0.009 (0.365)	0.034 (1.185)	-0.003 (0.836)	0.866
	Trad. Average	-8.227 (1.699)	0.449 (0.964)	-0.782* (2.009)	0.512 (1.150)	0.022 (0.493)	0.005 (0.183)	0.039 (1.197)	-0.004 (1.080)	0.833
Roads	Median Voter	-13.325** (3.811)	0.962** (2.969)	-0.332* (2.417)	0.676** (4.779)	0.069 (1.874)	0.025 (1.283)	0.079** (3.528)	-0.001 (0.207)	0.893
	Trad. Average	-8.250 (2.318)	0.505 (1.489)	-0.442 (1.307)	0.565 (1.725)	0.096* (2.644)	0.022 (1.016)	0.071** (2.957)	-0.001 (0.311)	0.886
Environ- mental Protection <sup>b)</sup>	Median Voter	-20.710** (4.780)	1.839** (4.579)	-1.019** (5.989)	0.069 (0.400)	-0.023 (0.507)	0.016 (0.655)	0.008 (0.290)	-0.007** (2.383)	0.823
	Trad. Average	-18.976** (3.920)	1.695** (3.624)	-0.612 (1.339)	0.435 (0.976)	0.054 (1.094)	0.030 (1.020)	0.016 (0.480)	-0.007* (2.133)	0.778
Aggregate <sup>c)</sup>	Median Voter	-11.596** (3.909)	1.075** (3.911)	-0.584** (5.016)	0.481** (4.009)	0.045 (1.435)	0.019 (1.134)	0.028 (1.491)	-0.001 (0.666)	0.918
	Trad. Average	-8.987** (2.848)	0.847** (2.815)	-0.735* (2.452)	0.326 (1.124)	0.088** (2.734)	0.021 (1.108)	0.025 (1.164)	-0.002 (0.871)	0.903

a) For notes see Table 1.

suggests that there are negative economies of sharing in consumption. For individual expenditure areas there are, of course, different results: Road services seem to be subject to strong sharing diseconomies, while education, recreation and sports as well as health and hospitals seem to enjoy positive sharing economies<sup>1)</sup>.

The empirical results presented show that - if adequately used - the median voter model is superior to the atheoretical approach used by traditional public finance. The question is, whether the estimations based on the median voter model are indeed adequate for the institution of representative democracy, or whether they are misspecified and must be appropriately modified or that even a completely different politico-economic model must be used. The latter is suggested when the median voter results for the two types of political institutions are compared: The demand for publicly supplied services reacts much more weakly in municipalities with representative democracy than in municipalities with direct democracy. This result holds for all areas, except one. There is thus evidence in favour of the hypothesis advanced above, that the citizen/voters in representative democracies are more strongly separated from collective decisions than are voters in direct democracies.

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1) It should be pointed out that:

- (i) the use of the ratio of  $\chi$  and  $(1 + \beta)$  leads to a biased value of  $\delta$  (usually too high a value) as the cities with sharing diseconomies are usually those which due to the large population have a high statistical weight;
- (ii) the size of the average coefficient of publicness does not warrant the conclusion that particular cities are too small or too large, to exploit the sharing economies. Actually, at the margin,  $\delta$  should exceed one; if not, this suggests that the community is too small and that there are sharing economies to be exploited (See BUCHANA and GOETZ, 1972). To account for this, it is necessary to test empirically whether  $\delta$  also rises with the size of cities, and at what point it reaches the unitary value, i.e., the efficient city size.



Our analysis has so far given first evidence for the influence of institutional regulation upon the outcome of collective decisions. The argument was, however, presented in a negative way, i.e., it was not enquired how the options open for decision are defined, how and in what way they are used. The next two parts of the paper offer some hypotheses and test them empirically. This also answers the question of how the estimation equation have to be modified for the case of representative democracy<sup>1)</sup>.

#### IV A THEORY OF REPRESENTATIVE DEMOCRACY

The simplest possible explanatory model of public expenditures in a representative democracy distinguishes two decision makers, the voters/taxpayers and the government.

The voters are assumed to act as if they maximized the utility of consuming the goods and services provided by the market and by the public. For that purpose, they have different possibilities of influencing the outcome of the government's decision process: In a direct way if there is the institution of an (obligatory or optional) referendum with respect to public expenditures; indirectly by voting at the next government election for those candidates from whom they expect the provision of publicly supplied goods conforming more closely to their wishes.

The government is also assumed to maximize utility. It should be noted that municipal governments are composed of various parties in Switzerland. Two different models of government behavior are appropriate:

- (a) It is often argued (e.g., STEINER, 1971, ch.1) that the referendum gives each party in government the chance of exercising influence. Members of minority parties

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1) It is not argued that the same questions would not also arise in the case of direct democracy. The conjecture is that the problems are less severe in the case of direct democracy.

have political weight by using the threat of undertaking a referendum. The median voter model is thus relevant in representative democracies, too, as this threat forces the government to take account of the voters'/taxpayers' wishes. If the persons and parties in government are truly representative of the whole electorate, the median member of government is decisive. In that case the public supply of goods and services corresponds to that in a direct democracy<sup>1)</sup>.

- (b) The situation may be quite different if the institution of referendum does not exist or is strongly restricted. There is much less need to follow the median voter's, and under appropriate conditions, the median government member's preferences. The parties' ideological views (tastes) will have a stronger influence on public expenditures. Elections are likely to play a more important role in municipalities without referendum. The government is forced to take account of the reelection constraint. It will move towards the median position at election time, only, provided the voters discount the past<sup>2)</sup>. It is thus expected that the time before election has an effect upon the expenditures. Except at election time, due to the possibility of forming coalitions and logrolling, it must be expected that the size and structure of public expenditures deviates from the median, especially that there will result a too large share of specific benefit compared to general benefit expenditure items. The budget size will in general be too large by the amount of the negative-sum games that coalitions tend to play<sup>3)</sup>.

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1) The possibility of launching a referendum leads to a similar outcome as competition within a single party system (for an analysis of such a system see BERNHOLZ, 1972, ch.3).

2) For this point see FREY (1976).

3) See, e.g., BUCHANAN and TULLOCK (1962, ch.11), and in a game-theoretic context especially DAVIS and MEYER (1969).

The discussion leads to a set of testable propositions about the influence of different institutions on the outcome of collective decision processes in representative democracies:

- (1) It is expected that the median voter model leads to superior results for municipalities with the institution of referendum, than for municipalities in which the governments are not subject to this restriction.
- (2) There is a presumption that in municipalities without referendum institution parties' ideological tastes are reflected more strongly in public expenditures and they are higher than in those cities in which referenda are used.
- (3) Time before election presumably has a stronger effect upon the size and structure of public expenditures in municipalities without referenda.

It should be noted that propositions (ii) and (iii) are quite tentative. There is presently no theoretical model of municipal government behavior available which would match the simplicity and rigour of the median voter model.

## V TESTING REPRESENTATIVE DEMOCRACY

To test proposition one, the 64 municipalities with representative democracy are divided into two groups according to whether they have the institution of (optional or obligatory) referendum (36 municipalities), or whether they do not (28 municipalities). Using the median voter equation (6), the expenditure functions for both groups are estimated<sup>1)</sup>.

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1) Another method would be to include all 64 municipalities in one equation in order to fulfill the ceteris paribus conditions and to account for the existence or non-existence of referenda by introducing a dummy variable. As these institutions do not only have level effects (as mentioned above), and as different collective processes are conjectured this approach is not used.

**Table 3:** Comparison of the Performance of the Median Voter Model in Representative Democracy: 36 Swiss Municipalities with Government-Constraints (Obligatory, Optional Referendum); 28 Swiss Municipalities without Government-Constraints (Average of Current and Investment Expenditures 1969-71<sup>a</sup>).

Spending Categories		Intercept	Demand Elasticities with Respect to				Population			$\bar{R}^2$
			Income ( $\alpha$ )	Tax Share ( $\beta$ )	Population ( $\gamma_1$ )	Tourists ( $\gamma_2$ )	Percent 0-19	Percent 65 <sup>+</sup>	Density	
General Admini- stration	With Constr.	-8.626 (1.800)	0.524 (1.195)	-0.443 (1.692)	0.749** (4.029)	0.015 (0.330)	0.025 (0.780)	0.027 (0.652)	0.002 (0.520)	0.892
	Without Constr.	-6.520 (0.891)	0.515 (0.752)	-0.422 (1.323)	0.295 (0.882)	0.071 (0.780)	0.002 (0.426)	0.022 (0.587)	0.007 (1.206)	0.583
Police, Fire Protection	With Constr.	-10.187 (1.513)	0.681 (1.136)	-0.331 (1.505)	0.696** (2.987)	0.058 (0.943)	-0.032 (0.753)	0.131* (2.446)	-0.004 (1.135)	0.905
	Without Constr.	-9.877 (1.200)	0.383 (0.497)	-0.160 (0.448)	0.960* (2.556)	0.151 (1.462)	0.038 (0.867)	0.148** (3.469)	-0.003 (0.381)	0.791
Education, Recreation, Sports	With Constr.	-10.383 (1.340)	0.881 (1.246)	-0.765* (2.709)	0.359 (1.195)	-0.026 (0.362)	0.006 (0.107)	0.018 (0.265)	-0.002 (0.039)	0.776
	Without Constr.	-8.124 (1.012)	0.583 (0.776)	-0.232 (0.664)	0.828* (2.260)	0.190 (1.887)	0.350 (0.821)	0.007 (0.176)	-0.001 (0.039)	0.711
Health, Hospitals	With Constr.	-50.876* (2.767)	4.751** (2.845)	-2.034** (3.025)	-1.184 (1.625)	0.064 (0.403)	0.012 (0.102)	0.028 (0.189)	-0.012 (0.975)	0.471
	Without Constr.	-0.396 (0.020)	-0.396 (0.210)	-0.575 (0.654)	0.937 (1.015)	0.590* (2.331)	0.010 (0.095)	0.031 (0.298)	-0.023 (1.384)	0.528
Social Assistance	With Constr.	-11.339 (1.891)	0.525 (0.960)	-0.461* (2.112)	0.998** (4.255)	-0.051 (0.905)	0.049 (1.197)	0.074 (1.425)	-0.003 (0.071)	0.895
	Without Constr.	-13.975 (1.812)	1.062 (1.472)	-0.880* (2.617)	0.305 (0.865)	-0.049 (0.506)	0.008 (0.203)	0.022 (0.556)	0.001 (0.008)	0.760
Roads	With Constr.	-9.435 (1.959)	0.612 (1.384)	-0.375* (2.112)	0.644** (3.429)	0.014 (0.319)	0.004 (0.107)	0.119** (2.839)	-0.002 (0.769)	0.914
	Without Constr.	-13.855* (2.566)	0.982 (1.944)	-0.169 (0.718)	0.830** (3.367)	0.149* (2.200)	0.035 (1.232)	0.073* (2.619)	0.001 (0.154)	0.847
Environ- mental Protection <sup>b)</sup>	With Constr.	-15.150* (2.440)	1.297* (2.289)	-0.843** (3.723)	0.383 (1.519)	-0.086 (0.327)	-0.014 (0.328)	0.034 (0.633)	-0.007 (1.688)	0.842
	Without Constr.	-23.244** (3.728)	2.021** (3.465)	-1.240** (4.559)	-0.284 (1.000)	0.011 (0.327)	0.058 (1.766)	0.010 (0.297)	-0.006 (1.145)	0.757
Aggregate <sup>c)</sup>	With Constr.	-11.269** (3.036)	1.026** (3.029)	-0.625** (4.627)	0.485** (3.751)	-0.015 (0.420)	0.010 (0.413)	0.058 (1.814)	-0.002 (1.623)	0.945
	Without Constr.	-9.817 (1.875)	0.876 (1.788)	-0.438 (1.919)	0.575* (2.405)	0.133 (2.027)	0.030 (1.111)	0.254 (0.934)	-0.00001 (0.0001)	0.848

a) For notes see Table 1.

As the estimation results of Table 3 suggest, the referendum institution is of considerable importance as a constraint on government: The estimates for the 36 municipalities with optional or obligatory referendum<sup>1)</sup> are (with one exception) better in terms of  $\bar{R}^2$ , and in two cases significantly better than the estimates for the 28 municipalities without such constraint upon government behavior<sup>2)</sup>.

The parameter values for the price and income elasticities are in the first case also more often statistically significant. With two exceptions the municipalities without referenda have lower price elasticities; this indicates again that citizens/taxpayers are more sheltered from the collective decision-making process in municipalities without referendum. It should also be noted that the values of income and price elasticities (though they are not always significant) in municipalities with referendum approach the corresponding parameter values in the estimates for direct democracy (see Table 1)<sup>3)</sup>

The other variables do not show major deviations from the results obtained so far (the respective coefficients are, however, somewhat less significant). For that reason, they - as well as the crowding parameters - are not further discussed here.

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1) 29 of 36 municipalities have both institutions. Due to the lack of detailed data it was impossible to find out which government constraint is more severe.

2) Using a F-test (two-tailed significance level of 5%).

3) For both groups of municipalities the traditional average model has also been estimated. As in the comparison of tables 1 and 2, municipalities with the institution of referendum showed (with one exception) worse results than those with the median voter model. In municipalities without the referendum institution the estimates with the traditional average model (eq.8) proved to be about equally good.

To test propositions two and three, estimation equation (6) is modified in the following way:

$$\ln E_{ij} = c + \alpha \ln \hat{Y}_j + \beta \ln \hat{t}_j + \gamma_k \ln n_{kj} + \mu_m S_m + \rho_{rj} T_{rj}^w + \rho_j TBE_j + \xi_j. \quad (8)$$

The variable  $T_{rj}^w$  gives the weighted tastes of the  $r$ 'th party group ( $r_1$  = left-wing,  $r_2$  = centre,  $r_3$  = right-wing) in the government of the  $j$ 'th municipality. The weights are the voting power ( $VP_{rj}$ ) of each party group in the respective government committee (thus  $T_{rj}^w = T_{rj} \cdot VP_{rj}$ ).  $TBE_j$  represents the "time before election" (in months) which a government of municipality  $j$  acting at the beginning of the period considered (here Jan.1, 1970) has available before the next election.

The dependent variables are public expenditures of the year 1970, because if the average over the periode 1969-71 were used (as above) there is the danger of a bias in the measurement of TBE (if there are elections in-between) and of the taste-variables (if the party composition of the government changes).

The exact specification of the parties in government according to left-wing, centre and right-wing is described in the appendix to this paper. It is sufficient to point out some differences in tastes which are necessary to make proposition two operational. It may be argued<sup>1)</sup> that in Switzerland:

- (i) Left-wing parties advocate a general increase in public expenditures, compared to other parties. This applied particularly for expenditures in the areas of education, social assistance (especially individual and family allowances, somewhat less the support of economic groups). They are, on the other hand, somewhat against expendi-

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1) The following characterization is based on an analysis of the major party programmes and on the literature of the Swiss party system. See in particular MASNATA (1963), GRUNER (1969), STEINER (1970), TSCHAENI (1969, ch.5).

tures for roads and civil defense.

- (ii) Right-wing parties (in comparison) advocate expenditure restrictions; they are in particular against high expenditures for individual and family allowances, but they are for the support of economic groups. They also advocate expenditures for the protection of property (police, justice) more strongly than left-wing parties, following their free enterprise ideology.
- (iii) The ideological tastes of the centre parties are difficult to evaluate. They are, on the whole, nearer to the right-wing parties' tastes, but they are against any government intervention. They argue correspondingly much more strongly for expenditure reduction, especially in the area of health and police.

There are various voting power indices<sup>1)</sup> which may be used as weights for the parties in the municipalities' government committees. None of them is preferable on a priori grounds. In the following, two indices are used which stress different aspects:

- (a) The Shapley-Shubik voting power index is a measure of the a priori probability of each group in the government committee to occupy the pivotal position, i.e. to turn a coalition from a losing into a winning coalition. This index stresses the build-up of coalitions.
- (b) The Banzhaf voting power index measures to which extent a party group has power by being an essential member of a distinct minimal winning coalition. An essential member thus renders a coalition nonwinning when it resigns or defects.

The estimation results for equation (6) - based on the original median voter model -, and for equation (8) - an application of the modified median voter model - are given in Table 4 for the 36 municipalities with the institution

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1) See, e.g., the discussion in BRAMS (1975, ch.5); see also SHAPLEY and SHUBIK (1953) and BANZHAF (1965).

Table 4: Performance of the Median Voter Model in Representative Democracy with Government-Constraint (Referendum): 36 Swiss Municipalities (Current and Investment Expenditures 1970<sup>a</sup>).

Spending Categories		Intercept	Demand Elasticities with Respect to				Population			Political Variables			$\bar{R}^2$
			Income ( $\alpha$ )	Tax Share ( $\beta$ )	Population ( $\gamma_1$ )	Tourists ( $\gamma_2$ )	Percent 0-19	Percent 65 <sup>+</sup>	Density	Left- Wing	Centre	Time Before Election	
General Admini- stration	(1)	-6.625 (1.637)	0.393 (1.065)	-0.292 (1.984)	0.732** (4.669)	0.039 (1.024)	0.011 (0.399)	0.006 (0.159)	-0.001 (0.290)	—	—	—	0.922
	(2)	-6.567 (1.523)	0.403 (1.012)	-0.322 (1.932)	0.709** (4.026)	0.037 (0.878)	0.007 (0.210)	0.010 (0.249)	-0.001 (0.437)	0.001 (0.400)	0.00002 (0.007)	0.002 (0.264)	0.913
Police, Fire Protection	(1)	-9.700 (1.388)	0.581 (0.931)	-0.313 (1.367)	0.675** (2.786)	0.068 (1.122)	-0.017 (0.389)	0.152* (2.727)	-0.003 (0.846)	—	—	—	0.899
	(2)	-10.681 (1.414)	0.696 (1.030)	-0.436 (1.727)	0.552* (2.074)	0.079 (1.221)	-0.021 (0.429)	0.178* (2.917)	-0.005 (1.108)	0.002 (0.541)	0.001 (0.220)	0.012 (1.282)	0.892
Education, Recreation, Sports	(1)	-0.965 (0.115)	-0.181 (0.236)	-0.356 (1.662)	0.783* (2.400)	-0.053 (0.673)	0.023 (0.406)	0.068 (0.938)	0.004 (0.724)	—	—	—	0.732
	(2)	-1.921 (0.234)	-0.463 (0.608)	-0.291 (0.912)	0.912* (2.706)	-0.073 (0.898)	0.023 (0.390)	0.046 (0.626)	0.005 (0.802)	0.001 (0.240)	-0.007 (1.600)	-0.011 (0.949)	0.753
Health, Hospitals	(1)	-66.550** (4.572)	6.140** (4.621)	-2.722** (5.137)	-1.895** (3.360)	0.045 (0.334)	0.090 (0.905)	-0.018 (0.141)	-0.009 (0.971)	—	—	—	0.580
	(2)	-66.716** (4.466)	6.298** (4.563)	-2.730** (4.730)	-1.851** (3.032)	0.029 (0.201)	0.038 (0.354)	-0.038 (0.287)	-0.012 (1.154)	0.009 (1.092)	0.005 (0.723)	0.013 (0.890)	0.560
Social Assistance	(1)	-4.260 (0.578)	0.002 (0.003)	-0.467 (1.741)	0.863** (3.023)	-0.029 (0.416)	0.021 (0.414)	0.034 (0.528)	-0.003 (0.613)	—	—	—	0.818
	(2)	-2.441 (0.329)	-0.192 (0.276)	-0.442 (1.512)	0.923** (2.987)	-0.030 (0.405)	0.026 (0.479)	0.025 (0.379)	-0.002 (0.470)	0.002 (0.366)	-0.005 (1.282)	0.003 (0.282)	0.813
Roads	(1)	-8.632 (1.503)	0.732 (1.397)	-0.351 (1.680)	0.625** (2.810)	-0.025 (0.468)	-0.034 (0.867)	0.051 (1.019)	-0.003 (0.818)	—	—	—	0.870
	(2)	-7.925 (1.305)	0.626 (1.117)	-0.292 (1.245)	0.686** (2.762)	-0.020 (0.332)	-0.022 (0.502)	0.041 (0.762)	-0.002 (0.444)	0.003 (0.775)	-0.002 (0.783)	-0.004 (0.359)	0.857
Environ- mental Protection <sup>b</sup>	(1)	-4.557 (0.591)	0.237 (0.337)	-0.444 (1.581)	0.791* (2.648)	-0.100 (1.386)	-0.027 (0.517)	0.064 (0.966)	-0.006 (1.117)	—	—	—	0.780
	(2)	-3.907 (0.482)	0.166 (0.141)	-0.345 (1.102)	0.878* (2.651)	-0.087 (1.093)	-0.006 (0.096)	0.051 (0.709)	-0.004 (0.626)	0.005 (1.012)	-0.003 (0.695)	0.004 (0.334)	0.763
Aggregate <sup>c</sup>	(1)	-6.146 (1.442)	0.527 (1.355)	-0.446** (2.878)	0.664** (4.024)	-0.020 (0.504)	0.007 (0.256)	0.557 (1.513)	-0.001 (0.442)	—	—	—	0.924
	(2)	-5.029 (1.157)	0.409 (1.017)	-0.390* (2.323)	0.742** (4.176)	-0.030 (0.700)	0.010 (0.309)	0.042 (1.073)	-0.001 (0.185)	0.001 (0.426)	-0.002 (1.144)	0.007 (1.134)	0.923

a) For notes see Table 1.



of referendum, and in Table 5 for the 28 municipalities without referendum. The first rows (1) present the results not considering ideological tastes. The second rows (2) present the results which take the ideological tastes of the various parties in government into account, as well as the time before election. All the estimates here shown use the Banzhaf coefficient as power index as it gave somewhat better results. In both tables the estimates for the left-wing and centre parties are given, only, because there is a high multicollinearity ( $R^2 = 0.67$ ) between the voting power indices of the centre and right-wing parties. The voting power index for the centre parties contributed somewhat more to the explanatory power of the equations.

In the case of the 36 municipalities with referendum (Table 4) the inclusion of tastes and time before election did not give better results than when they are excluded. There seems - as theoretically expected - to be little room for government parties to follow their own goals. The weak influence of time before election indicates that during an election period expenditures are only slightly higher than preferred by the median voter.

In the case of the 28 municipalities without the institution of referendum (Table 5) the government parties are more easily able to follow their own goals. This is shown by the average increase of 10% in  $\bar{R}^2$  in equation (8) when tastes and time before election are included. It is also reflected in the influence of tastes variables: The left-wing parties seem to support a general increase of public expenditures (the aggregate is significant at the 10% level of security, only). They support even more strongly higher expenditures for education and health, as is indicated by the significance at the 5%, respectively the 10% level of the estimated parameters. On the other hand, centre and right-wing parties tend to oppose expenditure increases, especially in education. The influence of time before election on government is also worth noting: The coefficient is for the aggregate statistically significant (at the 10% level of security); all

Table 5: Performance of the Median Voter Model in Representative Democracy without Government-Constraint:  
28 Swiss Municipalities (Current and Investment Expenditures 1970<sup>a)</sup>).

Spending Categories		Intercept	Demand Elasticities with Respect to				Population			Political Variables			$\bar{R}^2$
			Income ( $\alpha$ )	Tax Share ( $\beta$ )	Population ( $\chi_1$ )	Tourists ( $\chi_2$ )	Percent 0-19	Percent 65 <sup>+</sup>	Density	Left-Wing	Centre	Time Before Election	
General Admini- stration	(1)	-8.826 (1.483)	0.734 (1.317)	-0.525 <sup>*</sup> (2.021)	0.322 (1.184)	0.083 (1.106)	0.001 (0.043)	-0.022 (0.719)	0.004 (0.831)	—	—	—	0.765
	(2)	-7.676 (1.196)	0.565 (0.950)	0.449 (1.631)	0.352 (1.253)	0.037 (0.373)	0.003 (0.082)	0.0005 (0.012)	0.006 (1.092)	0.001 (1.092)	-0.0002 (0.310)	0.016 (0.066)	0.757
Police, Fire Protection	(1)	-14.990 (1.658)	0.977 (1.155)	-0.193 (0.489)	0.794 (1.925)	0.216 (1.901)	0.033 (0.693)	0.121 <sup>**</sup> (2.570)	-0.005 (0.660)	—	—	—	0.729
	(2)	-15.011 (1.578)	0.903 (1.023)	-0.181 (0.444)	0.816 (1.958)	0.245 (1.654)	0.055 (0.949)	0.127 <sup>*</sup> (2.309)	-0.002 (0.398)	0.002 (0.502)	-0.005 (1.445)	0.007 (0.349)	0.725
Education, Recreation, Sports	(1)	-0.981 (0.094)	-0.105 (0.107)	0.174 (0.382)	1.152 <sup>*</sup> (2.408)	0.297 <sup>*</sup> (2.253)	0.034 (0.618)	0.017 (0.304)	-0.010 (1.095)	—	—	—	0.555
	(2)	-1.333 (0.158)	-0.345 (0.411)	0.278 (0.771)	1.204 <sup>**</sup> (3.264)	0.323 <sup>*</sup> (2.469)	0.099 (1.101)	0.070 (0.068)	-0.003 (0.403)	0.009 <sup>*</sup> (2.113)	-0.008 <sup>*</sup> (2.649)	0.027 (1.457)	0.734
Health, Hospitals	(1)	-26.817 (1.271)	1.832 (0.934)	-1.169 (1.196)	0.506 (0.515)	0.553 <sup>*</sup> (2.377)	0.104 (1.027)	0.064 (0.624)	-0.015 (0.889)	—	—	—	0.570
	(2)	-18.413 (0.939)	0.521 (0.292)	-0.466 (0.535)	0.960 (1.129)	0.531 (2.287)	0.203 (2.002)	0.075 (1.117)	-0.009 (0.068)	0.013 (1.715)	-0.009 (1.631)	0.069 (1.631)	0.757
Social Assistance	(1)	-14.427 (1.461)	0.826 (0.894)	-0.681 (1.581)	0.561 (1.244)	-0.055 (0.441)	0.051 (0.997)	0.128 <sup>*</sup> (2.502)	0.005 (0.597)	—	—	—	0.727
	(2)	-14.426 (1.332)	0.705 (0.702)	-0.608 (1.309)	0.580 (1.223)	-0.074 (0.441)	0.075 (1.135)	0.162 (2.584)	0.007 (0.807)	0.004 (0.707)	-0.0005 (0.123)	0.014 (0.591)	0.710
Roads	(1)	-11.193 <sup>*</sup> (2.235)	0.896 (1.913)	-0.226 (1.034)	0.636 <sup>*</sup> (2.781)	0.200 <sup>**</sup> (3.781)	0.014 (0.523)	0.037 (1.409)	-0.004 (0.983)	—	—	—	0.845
	(2)	-12.309 (2.289)	0.940 (1.884)	-0.241 (1.047)	0.629 (2.673)	0.242 (2.893)	0.035 (1.077)	0.042 (1.353)	-0.002 (0.661)	0.003 (1.950)	-0.002 (1.192)	-0.002 (0.200)	0.837
Environ- mental Protection <sup>b)</sup>	(1)	-22.322 <sup>*</sup> (2.718)	1.763 <sup>*</sup> (2.295)	-0.981 <sup>*</sup> (2.738)	-0.139 (0.370)	0.118 (1.145)	0.107 (2.446)	0.039 (0.926)	-0.002 (0.308)	—	—	—	0.608
	(2)	-22.872 (2.586)	1.690 (2.059)	-0.916 (2.417)	-0.130 (0.337)	0.106 (0.769)	0.132 (2.443)	0.075 (1.469)	-0.0003 (0.038)	0.004 (1.003)	0.0005 (0.147)	0.011 (0.544)	0.593
Aggregate <sup>c)</sup>	(1)	-8.315 (1.411)	0.742 (1.345)	-0.270 (1.050)	0.696 <sup>*</sup> (2.590)	0.166 <sup>*</sup> (2.248)	0.030 (0.945)	0.026 (0.862)	-0.003 (0.527)	—	—	—	0.807
	(2)	-7.824 (1.572)	0.543 (1.176)	-0.178 (0.833)	0.735 <sup>*</sup> (3.373)	0.148 (1.905)	0.060 (1.660)	0.064 (1.296)	-0.001 (0.278)	0.004 (1.786)	-0.003 (1.680)	0.021 (1.922)	0.883

a) For notes see Table 1

coefficients (with one exception) have a positive sign. This suggests that time before election in municipalities without the referendum institution is indeed of higher importance than in municipalities without referendum, as expected a priori. It also suggests that public expenditures are on the average (over an election period of the government) too high. The negative sign in the case of municipal road expenditures is also interesting: It seems that inputs which are well visible for all have a high symbolic value.

#### VI. CONCLUDING REMARKS

The estimates using the median voter model are superior for municipalities with referendum than for municipalities without that institution, at least compared with the tradition average model. It is, however, necessary to develop politico-economic models when dealing with representative democracies, taking explicit account of the government's own goals and of the institutional set-up within which the government acts. Cross-section analysis is only partially suited for this task, i.e., time-series analysis should also be used, as done in the models of politico-economic cycles (See FREY and SCHNEIDER, 1975). Moreover, the influence of bureaucracy and interest groups may be so strong that completely different models may be needed.

## APPENDIX: DATA SOURCES

1. Public expenditures of the Swiss municipalities for various categories are taken from the statistics of the League of Swiss Cities (Statistik der Schweizer Staedte, Schweizerischer Staedteverband, Zurich, various years), and consist, if not otherwise stated, of the average cash value of current and investment expenditures 1969-71. The statistics used include all regular and special budgets and accounts (ordentliche und ausserordentliche Verwaltungsrechnung, Spezialrechnungen der politischen, Armen- und Schulgemeinden und der Buergergemeinden).

2. The distribution of personal income among households in 1970 (median and average) has been computed from the Federal Income Tax Statistics (Eidgenoessische Wehrsteuer 16. Periode: Natuerliche Personen, and, Eidgenoessische Wehrsteuer 16. Periode: Agglomerationen; both Eidgenoessische Steuerverwaltung, Berne, 1976) and from Census figures (Eidgenoessische Volkszaehlung 1970: Gemeinden, Eidgenoessisches Statistisches Amt, Berne, 1972) using a method developed first by JOEHR et al. (1966, p. 274 et seqq.) and then by NOTH (1975, p. 45 et seqq.). In order to take account of the distribution of households without franchised member, all seasonal (foreign) workers, and the permanent resident foreigners (i.e., those holding a permanent residence) are excluded. (However, the permanent resident foreign people of the municipalities of the Canton Neuchâtel are included because they have the right to vote on local topics since 1851).

Because the communities collect various kinds of receipts which have to a large extent the character of a flow a income - such as taxes paid by disenfranchised persons, Cantonal taxes which accrue partially to the municipalities in proportions fixed by law, and the funds transfered from the Cantons to the municipalities within intergovernmental relationships - and because the single voter/taxpayer who is confronted with a roughly proportional income tax can take

advantage thereof only to the extent of his share of the total income, these receipts are added to his income (after Federal and Cantonal Income tax) accordingly.

3. The corresponding municipal tax shares (tax-prices) has been derived from official statistics (Steuerbelastung in der Schweiz 1970, and, Finanzen und Steuern 1970; both Eidgenössisches Statistisches Amt, Berne, 1971, 1972) and from unpublished data of the Federal Bureau of Taxation. The personal income tax represents the main fiscal source of the Swiss municipalities. But, in addition, wealth and some minor, mostly proportional taxes, duties and fees are raised. All these receipts are assumed to be equally proportioned to the median voter as the directly allocated income tax.

4. All data on ecological characteristics are taken from official statistics (Statistik der Schweizer Staedte, Eidgenössische Volkszaehlung; both loc. cit.) and refer all to 1970.

5. Since studies and statistics on Swiss municipalities<sup>1)</sup> are almost rare, nearly all basic informations have been computed by questionnaires<sup>2)</sup>.

The grouping of the ideological tastes of the parties in government has been made according the divisions used in the literature (see, for example, GRUNER, 1969, p. 73 et seqq., TSCHAENI, 1969, ch.5 and 6), i.e., it consists of a left-wing right-wing scale of the parties. This national grouping for all parties of Swiss municipalities looks as follows:

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1) There exist, however, some inquiries on the kind and structure of the political system on state and national level (cf. CODDING, 1965, HENIG and PINDER, 1969). But on the local level there are only a few studies referring moreover to selected municipalities (see STEINER, 1963). The best information on the political system of Swiss municipalities is given by REES (1969, p. 432 et seqq.). A survey on the socio-economic structure may be found in MEYLAN, GOTTRAUX, and DAHINDEN (1972).

2) Another approach (see FRIED, 1975) is to infer of the political system of a Canton to the respective municipal party systems, using as justification the smallness of the Swiss Cantons. This procedure is, however, not acceptable, a point which has been mentioned by GIROD (1964, p.141 et seq.) and which follows also from the responses to our questionnaires.

<u>left-wing</u>	{	-Party of Work	= Partei der Arbeit (PdA)
		-Team	= Team
		-Social Democratic Party	= Sozialdemokratische Partei (SP)
		-Liberal Socialist Party	= Liberalsoziale Partei (LSP)
		-Catholic Socialist Party	= Christlichsoziale Partei (CSP)
<u>centre</u>	{	-Forum of Independent	= Landesring der Unabhängigen (LdU)
		-Protestant People Party	= Evangelische Volkspartei (EVP)
		-Catholic People Party	= Christlich Demokratische Volkspartei (CVP)
		-New Democratic Mouvement	= Neue Demokratische Bewegung (NDB)
		-Radical Party	= Freisinnige Demokratische Partei (FDP)
<u>right-wing</u>	{	-Liberal Democratic Party	= Liberaldemokraten (Lib)
		-Bourgeois and Farmers	= Schweizerische Volkspartei (SVP)

These parties are by no means equally distributed across the Swiss municipalities. Some municipalities are dominated by one party, in others varying mixtures of parties can be observed. On the average, the government of a typical 1970 municipality is composed by members of three to four of the parties mentioned above. There arises, however, a serious problem when the national classification scheme is used to derive the ideological tastes of the parties in government on the municipal level. The attitudes of the representatives of the same national party may deviate substantially from each other when we move from the central to the local level. For this reason, the above quoted literature is used and, after a discussion of the problem with political scientists experienced especially with the Swiss local party system<sup>1)</sup>, the ranking of the parties in some municipalities is changed<sup>2)</sup>.

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1) The author is indebted especially to Ruedi Burger (Univ. of Zurich) for this matter.

2) A list of the municipalities, whose party ranking has been changed cannot be given here, but this information may be obtained on request from the author.

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